Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

Claim 1 (currently amended): An apparatus for processing a semiconductor wafer, comprising:

    a.   an upper element;

    b.   a lower element, wherein the upper element and the lower element are configured to be brought together to form a processing volume; and

    c.   a seal energizer configured to maintain the upper element against the lower element to maintain the processing volume <u>by maintaining within a selected range a difference between a sealing force and a force generated within the processing volume</u> , ~~the seal energizer configured to control a sealing pressure in a seal-energizing cavity that varies non-linearly with a processing pressure generated within the processing volume~~.

Claim 2 (currently amended): The apparatus of claim 1, wherein the seal energizer is configured to minimize a non-negative net force against one of the upper element and the lower element above a threshold value, the net force following the equation $P1*A1 - P2*A2$, wherein P1 equals the sealing pressure, P2 equals ~~the processing~~ <u>a</u> pressure <u>generated within the processing volume</u>, A1 equals a cross-sectional area of the seal-energizing cavity, and A2 equals a cross-sectional area of the processing volume.

Claim 3 (original): The apparatus of claim 2, wherein the seal energizer is configured to maintain a difference $P1 - P2$ substantially constant during a processing cycle.

Claim 4 (currently amended): The apparatus of claim 1, wherein the seal energizer comprises a first cavity and [[the]] <u>a</u> seal-energizing cavity, the first cavity coupled to the seal-energizing cavity, the seal energizer configured so that a first pressure generated within the first cavity generates a second pressure in the seal-energizing cavity larger than the first pressure.

Claim 5 (original): The apparatus of claim 2, wherein the cross-sectional area A1 is larger than the cross-sectional area A2.

Claim 6 (original): The apparatus of claim 1, further comprising a means for generating supercritical conditions coupled to the processing volume.

Claim 7 (original): The apparatus of claim 6, further comprising a CO_2 supply vessel coupled to the processing volume.

Claim 8 (original): The apparatus of claim 1, wherein the upper element and the lower element form a supercritical processing chamber.

Claim 9 (original): The apparatus of claim 1, wherein the seal energizer comprises a hydraulic piston coupled to the lower element and configured to maintain the processing volume.

Claim 10 (currently amended): An apparatus for processing a semiconductor wafer, comprising:
    a. an upper element;
    b. a lower element, wherein the upper element and the lower element are configured to be brought together to form a processing volume; and
    c. means for maintaining a seal between the upper element and the lower element to maintain the processing volume <u>by maintaining within a selected range a difference between a sealing force and a force generated within the processing volume</u> , the means for maintaining a seal configured to control a sealing pressure in a seal-energizing cavity that varies non-linearly with a processing pressure generated within the processing volume.

Claim 11 (withdrawn): A method of maintaining a processing volume, the method comprising the steps of:
    a. generating a processing pressure within a processing volume; and
    b. controlling a sealing pressure to form and maintain a processing volume, wherein during a processing cycle the sealing pressure is varied non-linearly with the processing pressure.

Claim 12 (withdrawn): The method of claim 11, wherein the sealing pressure is related to the processing pressure by the equation $\Delta F = P1*A1 - P2*A2$, wherein P1 equals the sealing pressure, P2 equals the processing pressure, A1 equals a cross-sectional area of a seal-energizing cavity, and A2 equals a cross-sectional area of a processing volume, and the sealing pressure is varied to maintain ΔF above a threshold value.

Claim 13 (withdrawn): The method of claim 12, wherein a cross-sectional area of the processing volume is smaller than a cross-sectional area of the seal-energizing cavity.

Claim 14 (withdrawn): The method of claim 11, wherein the step of generating a processing pressure comprises containing a high-pressure processing fluid in the processing volume.

Claim 15 (withdrawn): The method of claim 14, wherein the high-pressure processing fluid comprises supercritical carbon dioxide.

Claim 16 (withdrawn): The method of claim 12, wherein the step of controlling a sealing pressure comprises generating a hydraulic pressure in the seal-energizing cavity.

Claim 17 (new): The apparatus of claim 1, wherein the sealing force is generated by a sealing pressure that varies non-linearly with a pressure generated within the processing volume.

Claim 18 (new): The apparatus of claim 1, wherein the seal energizer comprises a controller for determining a sealing pressure from a pressure generated within the processing volume and the selected range.

Claim 19 (new): The apparatus of claim 1, wherein a lower bound of the selected range includes a minimum force for maintaining the processing volume.

Claim 20 (new): The apparatus of claim 19, wherein the minimum force is based on a delay between generating the sealing force and generating the force within the processing volume.

Claim 21 (new): The apparatus of claim 1, wherein the force generated within the processing volume varies during a processing cycle.

Claim 22 (new):   An apparatus for processing a semiconductor wafer, comprising:

a.   a processing chamber comprising a processing volume for processing the semiconductor wafer by generating a variable processing pressure; and

b.   means for maintaining the processing volume by determining the variable processing pressure and generating a sealing pressure that varies non-linearly with the processing pressure.